GEOGRAPHIC SCHOOL BULLETINS

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BRITISH HOWITZER, fitted with hand-grips ("dolphins") and decorated like a Grecian urn, bellowed defiance at Yorktown's besiegers 175 years ago. American victory silenced it

NATIONAL GEOGRAPHIC PHOTOGRAPHER JOHN E. FLETCHER

under the Marquis de Lafayette, America's gallant French ally. In July, Cornwallis was ordered to fortify a land-sea base in the lower Chesapeake Bay. He chose Yorktown.

There was little favoring the site, except its easy access to the open Atlantic. The land side was vulnerable, its highest point rising only 80 feet above sea level.

Americans and French decided to pounce. Their strategy involved widespread forces. They would move a French fleet under the Comte de Grasse from the West Indies to Yorktown to prevent a British escape by sea. Washington's army and that of the Comte de Rochambeau would march 400 miles southward from New York and strike Yorktown by land.

NATIONAL GEOGRAPHIC PHOTOGRAPHER WILLARD R. CULVER

GEORGE WASHINGTON, beside his triumphant flag, watches a deputy receive the British surrender. This painting by John Trumbull hangs in the rotunda of the Nation's Capitol

The whole scheme worked; the British surrendered after a gun-hammering siege. Many of them gave vent to emotion at the formal laying-down of arms. Tears wet the face of a German colonel who had fought for England; many soldiers hurled their muskets on the stacks of surrendered weapons. But British and French spruced up in new uniforms. Ragged Americans donned their best.

Yorktown, like Williamsburg 14 miles to the west, now attracts thousands of visitors. Houses and breeze-swept fields protected by the National Park Service raise images of the village as it stood after its founding in 1691. Looking toward the redoubts with spike-like logs protruding to thwart attackers, one senses, too, the dangers American patriots braved at the very doorstep of their final triumph. A newly topped monument (repaired after lightning damage) tells their story.

Host to many distinguished visitors, Yorktown welcomed Lafayette in 1824. In preparing a house for his reception, someone found a blackened box marked "Cornwallis's Stores." In the box were candles; by their light the French nobleman and his American friends danced the night away.—S.H.

UMI

U. S. DEPARTMENT OF INTERIOR, T. L. WILLIAMS

Yorktown Remembers 1781-1956

TURN back the calendar just 175 years. The date: October 19, 1781. The scene: Yorktown, Virginia.

Battle-worn American soldiers and their French allies face bristling fortifications of a beseiged British army under General Lord Cornwallis. For nearly seven years the Revolutionary War has flamed. Now the last big British force, 7,500 men, is bottled up, backed against the broad-mouthed York River.

Allied soldiers stiffen, craning to watch a scarlet-clad drummer boy of a British guards regiment climb an opposing redoubt and beat a drum call for parley. A spruce officer joins him waving a white flag—and a brand-new nation, the United States of America, takes its first deep breath of peace.

Why did little Yorktown, relatively unknown, become the setting for these stirring events? The British—always sea-minded—had chosen it as a point from which to take ship if necessary. Here is how the situation developed:

General Washington's main army was threatening New York City, in a year when the British had practically despaired of reconquering the northern states. They believed, however, that Virginia could be subdued, and other southern states would return to Crown allegiance. So, in the spring of 1781, Cornwallis swung an army from North Carolina to Virginia, opposed only by a small force

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BRITISH PETROLEUM CO., © FOX PHOTOS

ADEN HARBOR is all most travelers see of the colony and its surrounding protectorate

Along the shore, dhows smelling of goats wait for cargoes and passengers bound for Gulf of Aden ports, then abruptly hoist creaking lateen sails to nose out onto deep blue water. Arab and Somali crewmen, born to these seas, feel their way down Africa's eastern coast as far as Mozambique. Splay-footed camels grunt into town from outlying oases.

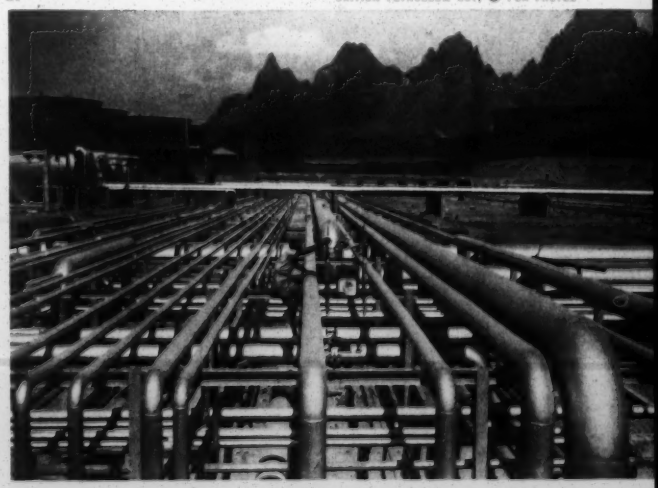
British administrators of the Crown Colony think first of the sea, as do most of the Arabs, Africans, Jews, and Greeks who make up the bulk of the population of nearly 100,000. For in addition to Aden's basic role as a refueling station and port of call, it controls much of the transshipment business of the Arab-Somalian world. A free port since Britain conquered its pirates in 1839, Aden handles coffee, grain, hides, fruit, sugar, tobacco, and cotton goods. Frankincense and myrrh are still sold in bazaars. The colony itself produces little except salt, fish, cigarettes.

When Britain took over, population was about 500. Aden boomed when the Suez Canal opened. Since then it has thrived like a filling station on a busy highway.

Should the highway close, Aden may slip back into its past—a harbor for dhows on the edge of inscrutable sands.—E.P.

FUEL FOR SHIPS comes from this grid of pipes at Aden's refinery, built in 1954 to process plentiful Middle East oil

BRITISH PETROLEUM CO., © FOX PHOTOS



INTERNATIONAL NEWS PHOTOS

Aden . . . *Filling Station on the Suez Highway*

IT'S a bleak harbor, sheltered by a curling promontory of barren rock—an old volcano. Houses cling to the shore and climb to a break in the crater wall as though snatching at any shaded respite from brazen heat. Offshore, vessels blister in the sun's pitiless glare, assorted national flags drooping at their sterns. Sailors pour dippers of sea water over their heads and vow, in a dozen languages, that they could cook supper on the deck plates. At sunset, crimsoned by a red haze of dust, all the world seems to wait for evening's first shy breeze.

That's one way of looking at Aden. Another way is to lay out the National Geographic Map of Northern Africa. You will see that Aden clings to the southwest corner of the Arabian Peninsula and that it guards Bab el Mandeb, the narrow strait connecting the Red Sea and the Indian Ocean.

Trace the sea lane from the Mediterranean to Bombay. Aden is the only sizeable port beyond the Suez Canal. Hence its importance—as refueling station for ships on the Suez run. Now that the canal's future is in doubt, so must be Aden's.

In normal times Aden handles more than 5,000 vessels a year. Rusty freighters and gleaming British liners bound for the Orient or Australasia sweep into the harbor to take on coal, or oil from Aden's new refinery. Once halted, each liner is surrounded by clamoring native bumboats—like a queen beset by ragamuffins. Braced against the pitch of their little boats, merchants display their wares to passengers crowding polished rails far above.

Pisa . . .

THEY say that when Galileo, one of the first great physicists, experimented with the laws of gravity, he chose Italy's leaning tower of Pisa as his laboratory. Historians dispute the legend. But none deny that the tilted tower, built as a campanile (bell tower) for the adjoining cathedral, would make a perfect platform for a man to drop things from. If a modern Galileo released a ball from the railing that surrounds the tower's topmost section, it would hit the ground nearly 17 feet from the nearest point of the wall.

The structure began to sag out of plumb while it was being built, from 1174 to 1350. Pisa's soft alluvial soil—the city straddles the Arno River only 13 feet above sea level—gave way under the weight of marble. Since the tower's foundations were sturdy and the lower walls 13 feet thick, the builders went ahead.

Pisa is more than its leaning tower. An ancient river port on the west coast of Italy's boot, it sprawls on the coastal plain some eight miles from the Ligurian Sea. In the middle ages when Italian cities struggled for commerce, Pisa became one of the greatest and most feared maritime republics. Its territory stretched along the coast from near Genoa down to the vicinity of Rome. Its navy scourged the sea; its soldiers waged stubborn, smouldering warfare against rival states of Genoa and Florence. Trade flourished and the little state's population soared to some 150,000 during the golden 12th century.

Pisa's decline started when Genoa's galleys smashed the Pisan fleet at Meloria, near Leghorn. Genoa took so many prisoners that the saying was, "To see Pisa, you must now go to Genoa."

In 1509, powerful Florence finally subdued the last struggles of Pisa's crippled might. Today Pisa is a placid Italian city of some 56,000, a junction for railroads. About 8,000 students fill its famed university which dates from the 14th century. Its chief industry is cotton manufacture. Tourists flock to see the tower, considered one of the modern wonders of the world. Unlike many buildings within the old walled city, the tower, cathedral, and domed baptistry escaped severe war damage. They remain a unit of irreplaceable Romanesque architecture.—E.P.

U. S. AIR FORCE

UMI

This 5-foot-2 Indian died about 2000 B.C. and was buried doubled up on his side, as the skeleton shows

"Gasoline lanterns were our only light, and as we dug in the dim and shadowy cave the effect was almost as if we were personally traveling backward in time, cut off from the modern world by thick limestone walls. Now, at 1000 B.C., it was fascinating to think of what would be happening in the rest of the world. About this time King Solomon would be ruling in Israel. The ancient Egyptian civilization along the Nile had already passed its peak. Rome . . . would not even be built for another two centuries."

So far, the digging has reached 14 feet. At the six-foot level, excavators found the skeleton of a cave Indian who died about 4000 years ago. Nearby, a dog had been buried ceremoniously in a well-made tomb. A stone blade lay beside the dog. Was it placed there in a gesture of affection for man's best friend? Such is one of the tantalizing questions that drive scientists ever on.—S.H.

BENEATH Russell Cave's water-grooved walls, men sift for artifacts from staked diggings

UMI

PHOTOGRAPHS BY BROOKS HONEYCUTT

Alabama's Oldest Home

THREE thousand years before the Great Pyramid of Egypt was built, sparks fell on Alabama from cave men's fires. That is the verdict of archeologists who recently knocked on one of mankind's oldest doorways—Russell Cave in the northeast corner of the southern State.

These ancient Americans left their record to the scientists through weapons, tools, and bones buried layer by layer in the cavern floor. The cave people immeasurably aided the scientific research by their abominably poor housekeeping. Instead of sweeping out litter, they lazily buried it, bit by bit. Thus they left behind the story of their cultures in successive pages that excavators now are turning back.

The National Geographic Society and the Smithsonian Institution are jointly working the site. Their findings mark an important milestone in man's unceasing quest for knowledge about his remote ancestors. Now, the Alabama cave men become the oldest known inhabitants of the southeast United States. The remains of one of their fires have been dated by radio-active carbon tests (an atomic-age device for determining age in organic matter) as some 8,160 years old—plus or minus 300 years.

The limestone cavern, long regarded by neighborhood people as just another cave, yawns 107 feet wide, 26 feet high, and 270 feet deep in a wooded hill overlooking a pleasant valley near Bridgeport, Alabama, close to the Tennessee border. Pictures of the cavern, the relics it secreted for millenniums, and the scientists of the expedition are carried with the article, "Life 8,000 Years Ago Uncovered in an Alabama Cave," which appears in the October National Geographic Magazine.

Smithsonian archeologist Carl F. Miller, author of the article, is directing the work. How does one feel on such an excursion into the past? Mr. Miller explains:

4000-year-old weapon point reminds of primitive wars

on an electric railroad. An engine whisks loaded cars to one of the main shafts. "Skips" (elevators) hoist the ore to the surface where machines crush the rock. Mechanical fingers rake heavy tungsten from lighter ore. Magnetism helps gather vital black particles.

Finally, "tailings"—the remains of the ore—drain off from the mill and are collected in huge sandlike fields. Even in these basins of "waste" material there is some $4,000,000 worth of tungsten waiting to be recovered some day when machines are able to do the job profitably.

Now so eagerly sought, tungsten was once a nuisance to English tin miners in Cornwall. In the 16th century they considered it harmful stuff that preyed on good tin. Germans called the mineral wolfram. *W* is its chemical symbol.

Tungsten's importance boomed as the result of military and industrial demands of both World Wars. Today it helps keep production humming. It is vital to devices like electronic brains and radar systems. It may help supersonic rockets to crack the "heat barrier" where air friction causes most metals to warp and buckle. And, incidentally, it has found its way to many dentist's offices, on the tips of drills.—E.P.

JACKHAMMER drills a blasting hole. Charge will fill mine tunnel with Carolina ore

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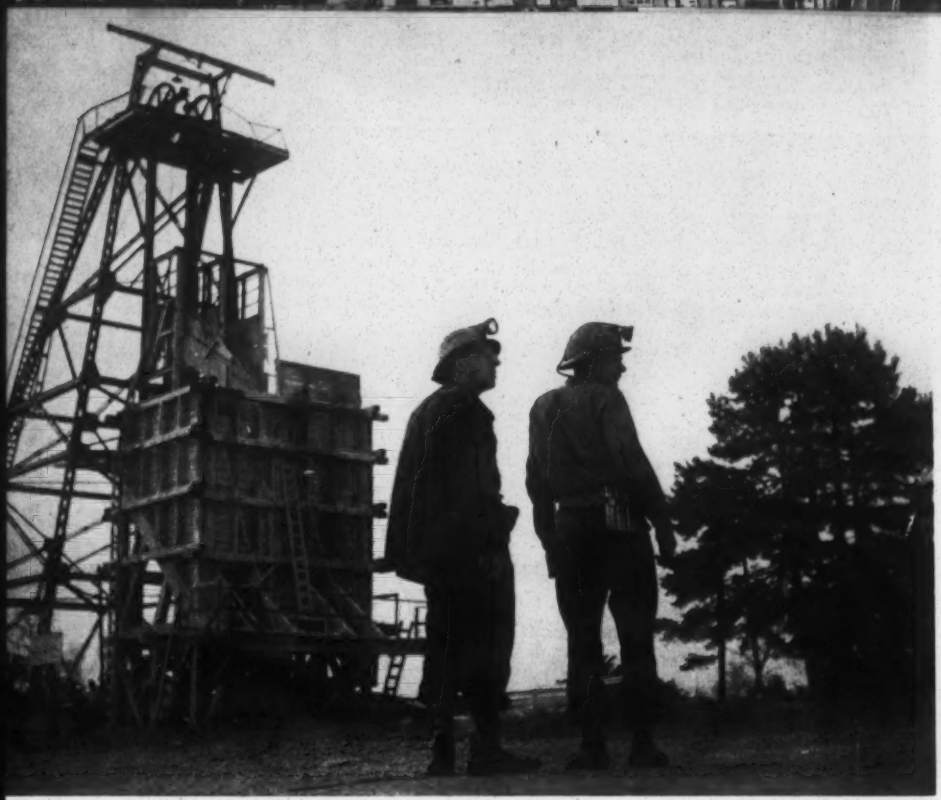

PHOTOGRAPHS BY KEN COOKE

TUNGSTEN

JET AGE MIRACLE METAL

THE shafthead and tipple above rise from a ridge in North Carolina, just a few miles south of the Virginia line. It doesn't produce gold or coal, but a mineral in many ways more valuable, though not as well known—tungsten. If all tungsten suddenly vanished, electric lights would fail, radios and television sets would go dead. Steel fabricating industries would slow down. Jet aircraft tailpipes would melt.

Almost as heavy as lead, tungsten resists heat better than any other metal. It takes a temperature of 6,143 degrees to melt it. That's why it can withstand the searing blast of a jet engine, why it can be made into filaments for lamps and electronic tubes, standing up under the white hot pulse of high voltage.

Moreover, tungsten is one of the hardest metals known to man. Combined with carbon, it is alloyed with steel to make cutting tools that do their work at high speed without growing dull or distorted. Only diamonds are harder.

Before World War II, the United States imported much of its tungsten. Some of the demand was filled by mines in the Rocky Mountains. Prospecting was spurred by wartime needs—and lack of imports. In 1942, two men found tungsten-bearing ore on a granite hill in North Carolina. A mine was sunk—now the richest tungsten producer in this country.

Deep in this mine—it goes down some 1,500 feet—jack drillers hack chunks of quartz from tunnels that trace the rich vein. Workers dump ore into chutes so that it tumbles to the lowest level. Opening the chutes, below, men fill carts

TUNGSTEN INSTITUTE (ABOVE), N.A.C.A. (BELOW)

FROM UNDER THE MOUNTAINS, A METAL TO TOUCH THE SKY

The mine above, in Nevada, taps resources of tungsten that underlie most Rocky Mountain states. Fifty-five years after the California gold rush, the same state uncovered the first American tungsten deposit. Mines now dot the west, from Washington and Montana down to Arizona. North Carolina's rich mine marks the only large deposit yet found in the east.

Tungsten occurs in every continent, but the biggest deposits lie in Asia. United States production satisfies most domestic demands. One spectacular use is in the air where it stands up under fire from a howling jet, right.